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An Internet Based System for Managing a Network of Electronic Advertising
Billboards through a Wireless Telecommunications System

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Field of the Invention

The present invention generally relates to the field of management systems supported by a global computer network. More specifically, the present invention relates to a computer system that manages a network of electronic advertising billboards through
5 a wireless telecommunications system.

Background

Technology is having a massive impact upon our economy. The global computer network known as the World Wide Web has facilitated a business revolution and
10 propelled the world into an Information Age. All sectors of the economy are seeking to improve their efficiency and productivity by incorporating the benefits brought by advancing technology.

The billboard advertising industry is one sector of the economy that could greatly benefit from the benefits of advancing technology and the World Wide Web. At present,
15 the most dominant technology used for billboard advertising is the well-known highway and street side billboard. These billboards are comprised of a metal or wooden frame that supports a large image advertising a business, product, event, political message, or team sport. However, with the invention of large flat screen displays, billboard advertising has moved into the electronics age. Through the use of large flat screen displays such as
20 the Jumbotron produced by the Sony Corporation, the billboard advertising industry can now project a commercial to viewers instead of a mere still image. In addition to these large flat screen television displays, various other large electronic displays that can project clear advertising images are now currently in use.

At present, the use of these large flat screen displays is not very common. Heavily traveled locations in the largest of cities like New York's Times Square have large flat screen displays. Several professional sports facilities have large flat screen displays such as Bank One Ballpark, home of the Arizona Diamondbacks. These large flat screen displays are used for advertising.

With the advance of technology and manufacturing capacity, it is anticipated that these large flat screen displays will increase in number. In fact, with time, large flat screen displays may replace the printed still image billboards now seen by the highway and in the cities. This future network of electronic billboard displays will require a computer-based network to manage them.

Summary of the Invention

The object of the present invention is a computer-based system that manages a network of electronic billboards through a wireless telecommunications system. This electronic billboard management system is comprised of a web-site supported by a global computer network. This web-site communicates with the network of electronic billboards through a variety of methods. The primary method of communication is a wireless telecommunications link. The web-site accesses a communications server that dials out to a communications antenna or satellite link. This antenna or satellite then transmits information from the web-site to the wireless receiver connected to the electronic billboard. Alternatively, billboards may include a direct telephone line for communication with the web-site.

To buy advertising space on this network of electronic billboards, a purchaser will access the web-site supported by the global computer network via an Internet service provider (ISP). Once the purchaser has accessed the web-site, the purchaser will first encounter the web-site login system. If the purchaser is a first time purchaser, he will have to go through a registration system. The purchaser will have to provide their personal name, company name, billing address, e-mail address contact information, and other general information. Once the purchaser has registered, the web-site registrations system will provide him with a login name and password. If the purchaser has already registered, they will simply provide their login name and password to the login system.

Once the purchaser has logged in, he or she has access to the Purchase Advertising System, Upload Advertising System, the Account Support System, and the Advertising Design System. To buy advertising on one or more of the electronic billboards, the purchaser will access the Purchase Advertising System. The Purchase Advertising System includes a series of maps that show the locations of the electronic billboards throughout the nation and the world. These maps are layered in order of detail. The first level map shows the entire world. A purchaser will then select a country in which they wish to advertise. From there the purchaser can select state, county, and city maps to determine the location of available billboards. In addition, these maps include the ability to access a digital image of the actual billboard and its surrounding vicinity.

A purchaser would now access the availability screen. This availability screen lists the locations and times of electronic billboard space that is still available for purchase.

To actually buy advertising space on these electronic billboards, a purchaser will access a purchase advertising order form within the Purchase Advertising System. On this order form, a purchaser can select the number of electronic billboards and the geographic area in which he wishes to advertise. In addition, the purchaser can select the time at which he wishes to advertise. For instance, a purchase could buy space on all of the electronic billboards in an entire city for five minutes at the same time. The web-site will determine the cost for renting the space requested by the purchaser. The purchaser would then enter credit card information to pay for the rented advertising space. Once the purchaser has paid for the rented space, the web-site will give him an access code to for use with the Upload Advertising System to upload the actual advertisement to the computer system.

A purchaser can create an advertisement through two methods. He or she can either create an advertisement using his or her own resources. Or, he or she can access the Advertising Design System. The Advertising Design System is a graphics art computer program that can create a variety of still or animated images. A purchaser who lacks the software to create their own advertising can thereby use the software supported by the web-site to create and advertisement.

Once a purchaser has created an advertisement, he will then access the Upload Advertising System. The purchaser will provide the Upload Advertising System with the code created by the Purchase Advertising System. This code enables the Upload Advertising System to access the purchaser's account and determine which billboards are to carry the advertisement at what times. The Upload Advertising System then accesses a communications server that dials out to a communications antenna or satellite link. This

antenna or satellite then transmits digital advertisement from the web-site to the wireless receiver connected to the electronic billboard. Alternatively, billboards may include a direct telephone line for communication with the web-site.

The primary object of the invention is to create a computer supported method and system that can manage a plurality of electronic billboards. A further object of the invention is to produce a system whereby purchasers of billboard advertising can buy advertising space on electronic billboards via the Internet. A still further object of the invention is to enable the Internet based billboard management system to communicate with the network of electronic billboards through a wireless communications system.

10 In one embodiment, the invention is implemented to provide a method for operating a computer supported method and system that can manage a plurality of electronic billboards. In another embodiment, the invention is implemented to provide an apparatus for operating a computer supported method and system that can manage a plurality of electronic billboards. In still another embodiment, the invention is
15 implemented to provide a signal-bearing medium tangibly embodying a program of machine-readable instructions executable by a data processing apparatus for operating a computer supported method and system that can manage a plurality of electronic billboards. Finally, another embodiment consists of logic circuitry having a plurality of interconnected, electrically or optically conductive elements configured for operating a
20 computer supported method and system that can manage a plurality of electronic billboards.

Further objects and advantages of the invention will become apparent as the following description proceeds and the features of novelty which characterize this

invention are pointed out with particularity in the claims annexed to and forming a part of this specification.

Brief Description of the Drawings

5 The novel features that are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself; however, both as to its structure and operation together with the additional objects and advantages thereof are best understood through the following description of the preferred embodiment of the present invention when read in conjunction with the accompanying drawings wherein:

10 Figure 1 shows a diagram of the overall system for managing a network of electronic billboards;

 Figure 2 shows a diagram of the wireless system of a single electronic billboard;

 Figure 3 shows a block diagram of the systems comprising the management system supported by a web-site on a global computer network;

15 Figure 4 shows the process of logging in and registering as a user;

 Figure 5 shows the process for searching for available advertising space;

 Figure 6 shows the process for buying an advertisement;

 Figure 7 shows the process for creating an advertisement;

20 Figure 8 shows the process for uploading an advertisement and distributing it to the network of electronic billboards;

 Figure 9 shows a user/registration database;

 Figure 10 shows an electronic billboard database;

 Figure 11 shows an information bearing cartridge;

Figure 12 shows an information bearing storage medium for the microcode used in processing the activity of the electronic billboard management system; and

Figure 13 shows an information bearing semiconductor chip.

5 Description of the Preferred Embodiments

A diagram of the overall system for managing a network of electronic billboards is shown in Figure 1. A plurality of personal home computers **110** are connected to a global computer network **115** such as an Internet. This global computer network **115** is connected to a local Ethernet **124**. The Ethernet **124** is managed by a system administration computer **123**. A database server **120**, a web server **121**, and a communications server **122** are connected to the Ethernet **124**. The database server **120** stores the user/registration database **900** shown in Figure 9. The database server **120** also stores the billboard database **10000** shown in Figure 10. The web server **121** supports the web site **300**, shown in Figure 3, that is accessible from the global computer network **115**.

The communications server **122** connects the Ethernet **124** to a satellite dish **126** or a radio antenna **127** through a communications system **125** in order to wirelessly communicate with one or more electronic billboard systems **130** located within a geographic region such as the State of Arizona. In the event a satellite dish **126** is used, data bearing signals **129** are transmitted from the satellite dish **126** to a satellite **128** and relayed to one or more of the electronic billboard systems **130**. The communications server **122** can also elect to transmit data bearing signals **129** through a radio tower **127** to

one or more of the electronic billboard systems **130**. The signals **129** can be either analog or digital signals.

In order to access the web site **300**, a user will first log on to one of the personal computers **110**. The user will then access the global computer network **115** from her personal computer **110**. Once the user has accesses the global computer network **115**, the user will direct her computer to access the web site **300** supported by the web server **121**. Once the user is in communication with the web site **300** whose architecture is shown by the chart **300**, the user can conduct electronic billboard commerce.

Figure 2 shows a diagram of the wireless system of a single electronic billboard.

Visual output of the advertisement is seen on display **201**. Display **201** could preferably be a gas-discharge display, which is commonly known as a plasma display. A gas-discharge display contains neon between a horizontal and vertical set of electrodes. When a vertical and a horizontal electrode are charged, the neon glows at their intersection, emitting light. Display **201** may equally be a cathode ray tube (CRT) commonly used with desktop computers, a liquid crystal display, light emitting diode display, or a flat panel electroluminescent display.

Display **201** may be a liquid crystal display (LCD) commonly used in laptops, cell-phones, fax machines, etc. An LCD display uses organic fluids called liquid crystals, because liquid crystals possess two important properties. First, liquid crystals are transparent but can alter the orientation of polarized light passing through them. Second, the alignment of liquid crystal molecules and their polarization properties can be changed by applying an electric field. Liquid crystals are sandwiched between two glass plates, the outsides of which having been coated with polarizing filters and the inner plate is

typically backlit via fluorescent light. Inside these glass plates is a matrix of electrodes. When an element of the matrix, called a pixel, experiences a voltage change, the polarization of the adjacent liquid crystal molecules change, which alters the light transmitted through the LCD pixel and hence seen by the user.

5 Display **201** could equally use light emitting diodes (LEDs) which are a semiconductor device that converts electrical energy into light. LEDs work on the principle of electroluminescence and are produce little heat for an amount of light output. Display **201** could be a flat panel electroluminescent display, where a thin phosphor layer is set between vertical and horizontal electrodes. These electrodes form an X-Y
10 Cartesian coordinate system. When a vertical and a horizontal electrode are charged, the phosphor at their intersection emits light.

The display **201** is connected to a local computer **202** that is in communication with an antenna **203**. The antenna **203** receives signals **129** transmitted from either the satellite **128** or the radio tower **127**. The local computer **202** supports the
15 communications software that acquires and stores the signals **129** received by the antenna **203**. The local computer **202** also supports the software that operates the display **201**.

Figure 3 shows architecture menu **300**. Architecture menu **300** comprises login system **302**. If a prospective user is not yet registered, there is registration system **304**. Once the user is registered, the user has access to purchase system **310**, upload system
20 **312**, create ad system **314**, and account system **316**. In the event that a purchaser has not already produced an advertisement to show on a display **201**, the purchaser can create an advertisement using the create ad system **314**. The create ad system **314** is comprised of a photo-paint software system that produces animated and still drawings. The purchaser

can access the account system **316** to examine the financial activity on their account. The purchaser can view how many billboards she has purchased and at what price. The purchaser can also update their contact information such as phone, fax, mailing address, and email address. The purchaser can also update their billing information or credit card
5 information through the account system **316**.

Registration system is further developed in Figure 4. When a user accesses the website, step **400**, step **402** is used to determine whether the user is already registered. If the user is already registered, the process flows to step **404**, which sends the process to step **500** in Figure 5.

10 However, if the user is not already registered in step **402**, the registration process flows to step **406**, where the user completes an online registration form. The registration process then flows to step **408**, where the input provided by the prospective user is checked. If the input is not valid, due to invalid email address, nonexistent credit card information, etc., step **408** returns to step **406** and the user is again asked to complete the
15 online registration form. However, if the input is verified as valid in step **408**, the registration process flows to step **410** where the system stores the data for future use. Then the registration process flows to step **412**, where the system emails a logon name and password to the user via the email address supplied by the user. Then the registration process ends at step **420**.

20 In Figure 5, the user enters his or her logon and password in step **502**. In step **504**, the system searches the database of users. From step **504**, the logon process flows to step **506**, where the system checks as to whether the logon and password are valid. If the logon and password are not valid, the logon process flows to step **508**, where the counter

of the number of logon attempts is incremented by one, $pwtrial = pwtrial + 1$. In step 510, the counter $pwtrial$ is compared against a threshold number $N1$. This threshold number could be set by the system administrator. A suitable value for $N1$ could be three. If the counter does not exceed this threshold number $N1$ in step 510, the logon process flows to step 511, where the user receives an “Invalid logon and password” message. Then, the process goes back to step 502 for another logon attempt.

However, if the counter of the number of logon attempts exceeds threshold $N1$ in step 510, the logon process flows to step 512 and the account is frozen for security reasons. This is to prevent hackers from causing harm. The logon process flows to step 514, where a security alert is issued to the system administrator before the logon process “abnormally ends” or abends in step 516.

If the user provides a valid logon and password in step 506, the logon process flows to step 520, where the counter of the number of logon attempts is reset to zero, $pwtrial=0$. Then the logon process flows to step 522 where the user is given access to the main menu, which was described in Figure 3. The logon process flows to step 524, signifying that the logon process is now complete.

Once the logon process is completed, Figure 5, the user may enter the access purchase system process, step 600 of Figure 6. The purchase process flows to step 602, where the system gives the user a table of available locations, available time periods or slots, and the prices associated with those locations and time periods. The purchase process then flows to step 604, where the user specified the desired billboard location and time periods. The purchase process then flows to step 606, where the purchase process searches the database for the availability of the desired billboard location and time

periods. In step **608**, the query is made as to whether the requested location and time is available. If the requested location and time is not available, the purchase process flows to step **606**, where the user is queried if he or she desires to continue with the purchase process. If the user does wish to continue with the purchase process in step **616**, the process flows to step **602**. If the user does not wish to continue with the purchase process in step **616**, the purchase process exits at step **630**.

If in step **608**, the requested location and time is available, the purchase process flows to step **610**, where the purchase process accesses the price database. Then the purchase process flows to step **612**, where the user is asked whether he or she wishes to purchase the available location and time. If the user answers no, the purchase process flows to step **616**. However, if the user does wish to purchase the location and time, the process flows to step **618** and the user then completes an online purchase form. The purchase process then flows to step **620**, where the user is provided with an upload code, for uploading his or her advertisement. Then, the purchase process flows back to step **616**, where the user is queried whether he or she wishes to continue and possibly make additional purchases.

In Figure 7, the user prepares to upload advertising in step **700**. The upload process flows to step **702**, where the user provides the upload code. The upload process flows to step **704**, where the system searches the upload database in an attempt to check the validity of the upload code. If the upload code is correct, the upload process flows to step **720**, where the counter for attempts to enter the upload code is reset to zero, uptrial=0. Then the upload process flows to step **730**, which signifies a jump to step **800** of Figure 8.

If the upload code is not correct in step **706**, the logon process flows to step **708**, where the counter of the number of upload code attempts is incremented by one, $uptrial = uptrial + 1$. In step **710**, the counter $uptrial$ is compared against a threshold number $N2$. This threshold number could be set by the system administrator. A suitable value for $N2$ could be three. If the counter does not exceed this threshold number $N2$ in step **710**, the logon process flows to step **718**, where the user receives an "Invalid upload code" message. Then, the process goes back to step **702** for another logon attempt.

However, if the counter of the number of upload code attempts exceeds threshold $N2$ in step **710**, the logon process flows to step **712** and the account is frozen for security reasons. This is to prevent hackers from causing harm. The logon process flows to step **714**, where a security alert is issued to the system administrator before the logon process "abnormally ends" or abends in step **716**.

Figure 8 gives the rest of the upload process, which begins with step **800**, which the user reaches upon correctly entering his or her upload code. The upload process then continues to step **802**, where the system issues a request to the user for the location of the advertisement file for upload. The upload process flows to step **804**, where the user provides the location of the file to be uploaded and the file is uploaded to the system. The upload process then flows to step **806**, where the system performs a check of the advertisement file, to insure it is in the correct format and compatible with the display technology which will display the file. If the advertisement file is not correct in step **806**, the upload process flows to step **808**, where an "Improper Format" message is displayed to the user. Then the upload process flows from step **808** to step **802** where the user can upload a correct advertising file.

If the advertising file is in the correct format in step **806**, the upload process flows to step **810**, where the system accesses the communications server. The upload process then flows to step **812**, where the system transmits the advertisement file to the remote electronic billboard network. Then upload process then flows to step **814**, where the advertisement file is displayed on the electronic billboard at the desired location and desired time. The upload process then flows to step **820**, which is the conclusion of the upload process.

Figure 9 shows a user/registration database **900**. Template **900** includes the contact person's name **901**, mailing address **902**, city **903**, state **904**, country and Zip code **905**, phone number **906**, fax number **907**, email address **908**, and company name **909**, name of contact **910**, username **911**, password **912**, and Internet address **913**. A purchaser seeking to register as a user on the system will provide information for **901**, **902**, **903**, **904**, **905**, **906**, **907**, **908**, **909**, **910**, and **913**. The registration system **304** generates the username **911** and the password **912** and stores them in the table **900**. The registration system emails the username **911** and the password **912** to the purchaser at the email address **908**.

Figure 10 shows an electronic billboard database **1000**. The table **1000** provides a listing of all of the electronic billboard systems **130** in the network by their billboard number **1001**, street address **1010**, city **1011**, state **1012**, and zip code **1013**. The purchase system **310** uses the information **1001**, **1010**, **1011**, **1012**, and **1013** to generate a map showing the locations of billboards **130** available for purchase. Section **1014** provides a table of the times and prices of the billboards **130**. The billboards in this table are shown being for sale in four hour blocks of time at 12am, 4 am, 8 am, 12pm, 4pm,

and 8 pm. An "X" in a time block indicates that the billboard **130** has already been purchased. A number in the time block indicates the price at which that four hour time block for that billboard **130** can be purchased. If the purchaser buys a block of time, the purchase system **314** writes an "X" in the table for every block of time purchased. While
5 this table is shown dividing the available electronic billboard space into four hour blocks of time, any time increment is possible.

Figure 11 shows a typical floppy disk cartridge **1100** which could be used hold the microcode used in processing the activity of the electronic billboard management system. Floppy disk cartridge **1100** consists of cartridge body **1101** and shutter **1102**.
10 Shutter **1102** has an opening **1103**, so that I/O can be performed on the data on disk inside of the cartridge body **1101**. Cartridge body **1101** has an opening **1104** so that the hub **1105** of the floppy disk can be rotated by a floppy disk drive, for the purposes of I/O.

Figure 12 shows a typical floppy disk **1200** which would be contained in floppy disk cartridge **1100**. Floppy disk **1200** has an circular outer perimeter **1201**. Data is
15 recorded in circular or spiral tracks **1203** between the inner recording radius **1204** and the outer recording radius **1202**. Hub **1205** is used to rotate the floppy disk **1200** so that I/O can be performed on the data in tracks **1203**.

Figure 4 shows computer chip **1300**. Computer chip **1300** may be a RAM, EPROM, or ASIC chip, etc. The exterior of chip **1300** shows a typically square or
20 rectangular body **1301** with a plurality of electrical connectors **1302** along the perimeter of body **1301**. There is typically an alignment dot **1303** at one corner of chip **1300** to assist with the proper alignment of chip **1300** on a card. Within body **1301**, chip **1300** consists of a number of interconnected electrical elements, such as transistors, resistors,

and diodes. These interconnected electrical elements are fabricated on a single chip of silicon crystal or other semiconductor material such as gallium arsenide (GaAs) by use of photolithography. One complete layering-sequence in the photolithography process is to deposit a layer of material on the chip, coat it with photoresist, etch away the photoresist
5 where the deposited material is not desired, remove the undesirable deposited material which is no longer protected by the photoresist, and then remove the photoresist where the deposited material is desired. By many such photolithography layering-sequences, very-large-scale integration (VLSI) can result in tens of thousands of electrical elements on a single chip. Ultra-large-scale integration (ULSI) can result in a hundred thousand
10 electrical elements on a single chip.

While the invention has been shown and described with reference to a particular embodiment thereof, it will be understood to those skilled in the art, that various changes in form and details may be made therein without departing from the spirit and scope of the invention.